

BIOMECHANICAL INVESTIGATION OF SUTURE PATTERNS TO REPAIR THE INCISION OF THE DEEP GLUTEAL MUSCLE DURING TOTAL HIP REPLACEMENT IN DOGS

Choice of the best technique to repair surgical transected deep gluteal muscles during total hip replacement in dogs is influenced by multiple factors: properties of the muscle, suture diameter and characteristics, suture pattern biomechanics, amount of foreign material and muscle healing. The best suturing technique has to resist the strength formed during early active exercise protocols while maintaining the margins of the incision in close proximity.

In this study was tested the biomechanical properties of interrupted Horizontal Mattress pattern (HM), the best resistant to tension technique advocated to repair transected muscles, and Schiller Suture pattern (SS), a newly developed technique created by Dr. Teresa Schiller used to repair the incision of the deep gluteal muscle during total hip replacement in dogs.

The mechanical properties of the patterns were assessed through vertical mechanical traction single pull-to-failure destructive tests on a custom-made tensiometer equipped with a WH-A08 portable scale. Forty 6x10cm unidirectional soft polyethylene foam samples were used as a matrix for implantation of the suture patterns. All samples were preloaded with 9.8 N during one minute and strain was employed through application of force at a rate of 0.415 ± 0.063 N/s. The recorded variables were suture pull-out value (SPOV), Mode of failure (MOF), Total amount of foreign material (TSM), gap at preload (GAP), dynamic displacement at 1, 2, 3 and 4 Kgf, at 80% and 90% the SPOV and at SPOV. Stiffness was calculated at 2 Kgf.

Results showed that no significant differences were found between SPOVs of both groups. According to MOF, all SS failed by cut-through, 35% of which failed in both margins. In HM 85% failed by transection and approximately 72% of the stitches failed in the site of knot implantation. Differences in TSM were not considerable in normal sized deep gluteal muscles. Displacement at SPOV was higher in the HM group ($32.9 \times 10^{-3} \pm 2.79 \times 10^{-3}$ m) than in SS group ($22.6 \times 10^{-3} \pm 2.2 \times 10^{-3}$ m), $F(1, 38) = 177.95$, $p < 0.001$. GAP and other dynamic displacements were also significantly higher in HM group ($U = 0$, $p < 0.001$). Stiffness was significantly greater for SS ($Mdn = 4903.25$ N/m) than for HM group ($Mdn = 1634.42$ N/m), $U = 0$, $p < 0.001$, $r = 0.87$. For these reasons, we concluded that SS represents the best option to repair the incision of the deep gluteal muscles in dogs.

Keywords: Dog, deep gluteal, muscle, incision, suture pattern.